Chapter 2

Proposed Action and Alternatives

2.1 Introduction

This chapter presents information concerning the applicant; describes the applicant's proposal, including the location, utility routing, safety features, and construction methods; identifies mitigation measures inherent in the design; describes the No Action Alternative; discusses alternatives considered by the applicant but not brought forward; and describes the costs for the project.

Rules published under the Washington State Environmental Policy Act (SEPA) require that this EIS describe the proposal and alternative courses of action. Reasonable alternatives shall include actions that could feasibly attain or approximate a proposal's objectives, but at a lower environmental cost or decreased level of environmental degradation. The rules also require that the impacts of these alternatives be compared with the impacts of not implementing the alternatives (No Action) and that the advantages and disadvantages of delaying the approval for some future date be discussed. As this chapter explains, two alternative sites were considered for the siting of the power plant, and one was eliminated from further study based on its failure to meet the proponent's objectives. Private applicants, under SEPA, are not generally required to examine alternative sites, especially if a rezone is not required. Therefore, this EIS evaluates the potential impacts of the S2GF and its associated facilities, as described in this chapter, and the No Action Alternative.

2.1.1 The Applicant

The applicant for the S2GF, the natural gas pipeline and the U.S./Canadian 230 kV electrical transmission line is Sumas Energy 2, Inc. (SE2). The water supply and wastewater collection pipelines to the plant site would be constructed, owned and maintained by the City of Sumas.

SE2 was incorporated in the State of Washington in September 1998. SE2 is a special purpose corporation formed under Title 23B of the Revised Code of Washington to develop, permit, finance, construct, own, and operate the S2GF. It is wholly-owned by Mr. Darrell Jones and his family. SE2 would own and operate the S2GF and would manage all of the facility's affairs, including activities related to obtaining permits and other approvals required for the development of the project.

Also participating in the development process as Project Manager, is National Energy Systems Company (NESCO), which is affiliated with SE2 through common ownership and control. Formed in 1985, NESCO is in the business of developing, owning, and operating large industrial and commercial projects. NESCO has developed, owned, and operated lumber mills in Washington and Wyoming, six power plants in six states from Michigan to Alaska, and natural gas and oil properties in British Columbia and Alberta, Canada. NESCO is a Washington State corporation, and is wholly-owned by Mr. Darrell Jones and his family.

2.1.2 Scope of this EIS

The Draft EIS for the S2GF project was published on March 15, 2000. The original comment period for the Draft EIS was to have ended on April 17, 2000, which was 30 days after publication. Prior to and during the public comment meetings on April 3 and 4 in Bellingham and Sumas, EFSEC received requests to extend the comment period. Based on these requests and as provided in the Washington Administrative Code (WAC) 197-11-455(7), EFSEC extended the comment period 15 days to May 2, 2000.

The scoping phase of the EIS process was completed on October 1, 1999. Based on the comments received and information compiled during the scoping phase, EFSEC determined that the scope of this EIS consists of a description of the proposed action and alternatives; a discussion of the affected environment; an evaluation of the potential direct, indirect, and cumulative impacts; and an identification of suitable mitigation measures associated with the construction and operation of all components (and connected actions) of the proposed project, including the generating plant, water supply pipeline, waste water pipeline, natural gas supply pipeline, and electrical transmission line to the Canadian border.

In evaluating potential impacts from construction and operation of these components and connected actions, the following elements of the natural and built environment are addressed in this EIS:

- Air Quality
- Water Resources/Supply
- Noise
- Wetlands and Vegetation
- Fish and Wildlife
- Visual Resources
- Cultural Resources
- Socioeconomics
- Energy
- Traffic and Transportation
- Communications
- Health and Safety

This EIS incorporates information from a NEPA environmental assessment (EA) discussing evaluation of impacts associated with the Canadian portion of the 230 kV transmission line. The EA is entitled *Environmental Assessment Report, Sumas*

Energy 2, Inc. 230 kV Electric Transmission Line, Sumas, Washington to B.C. Hydro's Clayburn Substation, Abbotsford, B.C. (Norecol-Dames & Moore 1999). This is a NEPA report that was issued by the U.S. Department of Energy.

Environmental impacts resulting from the construction and operation of the 230 kV transmission line sited in Canada will be assessed by appropriate Canadian regulatory jurisdictions.

2.2 Description of Proposed Action

The Proposed Action is the construction and operation of the S2GF, a 660 MW combined-cycle combustion turbine electrical generation facility and associated components in Sumas, Whatcom County, Washington (Figure 2-1). The generation plant component of the project would occupy a portion of a 37-acre site within the industrial area of Sumas, just north of the Sumas Cogeneration Company LP No. 1 Generation Facility (SCCLP) 125 MW power generation facility. The facilities, equipment, and features to be installed on the proposed generation plant site are shown in Figure 2-2, and include:

- Two combustion turbines and their associated electrical generators
- Two heat recovery steam generators and their associated 180-foot-high exhaust stacks
- One steam turbine and its associated electrical generator
- One steam condensing system consisting of a dry-cooled condenser, a water-cooled condenser, and a cooling tower
- One substation, consisting of main electrical transformers and their associated switch gear
- One 2.5-million-gallon fuel storage tank[1], and associated containment dike
- A stormwater detention system, sized for the 10-year, 24-hour storm, and for the 100-year, 24-hour storm in the absence of flood waters that would inundate the stormwater detention pond
- Access driveways and parking areas
- A 2.81-acre wetland fill
- A 9.97-acre wetland mitigation area (creation and enhancement, located east and west of the proposed S2GF site)

1 In its final briefing to the Energy Facility Site Evaluation Council (September 5, 2000) the applicant proposed to reduce the diesel storage tank size to 1.5 million gallons. The environmental impact of this proposed design modification has not been analyzed in this FEIS.

Figure 2-1

Figure 2-2

- A 9.44-acre forested wetland preservation/buffer area
- Landscaping, including mature tree plantings along the south, east, and north edge of the generation plant site

In addition to the above generation plant site facilities, equipment, and features, other components making up the project include the following:

- A natural gas supply pipeline consisting of a 4.5-mile-long, 16-inch-diameter pipeline constructed from the Canadian border to the plant site. The new pipeline would be constructed within the right-of-way (ROW) of an existing natural gas pipeline serving the SCCLP facility to the south. Approximately the last 0.25 mile of the line, extending from the existing power plant north across State Route 9 to the proposed plant, would require a new ROW (Figure 2-3).
- A 230 kV U.S./Canadian electrical transmission line extending north from the site approximately 0.5 mile to the U.S./Canada border, then following the Canadian Pacific Railroad line for approximately 5.3 miles to BC Hydro's Clayburn station (Figure 2-3).
- A process/potable water supply pipeline from the City of Sumas water system, requiring upgrading a 1,000-foot portion of an existing City supply line from a 6-inch-diameter to a 10-inch-diameter line, extending the new 10-inch-diameter line to the plant site, upgrading certain City water pumps and valves, and drilling an additional well at the City's May Road Well Field site (Figure 2-3).
- A wastewater discharge pipeline from the plant to the City of Sumas wastewater collection system at the plant site boundary, and then through existing lines for treatment in Canada. Within the City of Sumas, the City would be required to extend the gravity sewer line and force main serving the area, and upgrade Pump Station No. 3 to connect to and accommodate the S2GF wastewater stream (Figure 2-3).

The following paragraphs present additional information regarding the proposed approach and methods for construction and operation of the project.

2.2.1 Construction

2.2.1.1 Generation Plant Site

Site Fill Material

The site elevation is below the 100-year flood elevation, as is most of the industrially zoned property west of Sumas. Prior to facility construction, the site would be raised above flood elevation using fill transported to the site from local gravel pits. Some existing wetlands on the site would be filled and new wetlands established. Silt and

Figure 2-3

erosion control would be implemented as appropriate to address bare earth and grade conditions. The areas would then be preloaded as required by design.

The proposed fill material would be pit run (unwashed and unsorted) gravel. The pit run gravel would be trucked from nearby gravel pits to the site. The proposed final site elevation is 45 feet, which is approximately 4 to 5 feet higher than the existing site, although the amount of fill needed is variable. The location of the source for the fill materials, and the truck routing are described in Section 3.10 – Traffic, Parking, and Transportation.

It is projected that approximately 130,000 cubic yards (188,627 tons) of fill material would be imported to bring the construction site to its final grade. This material would be delivered by truck and trailer (32-ton capacity) over a 90-day period and would require a total of approximately 5,895 truck trips. Based on an eight-hour day, five-day per week work schedule, on average, approximately 89 daily truck trips (11 trucks per hour) would be required to import all fill material within the 90-day period. However, it is anticipated that the staging for this initial phase of construction would be designed to accommodate up to 25 to 30 trucks per hour.

Generation Plant Components

All of the process components except the main transformers are too large to be shipped completely assembled. They would be shipped in pieces and then reassembled onsite during construction. Construction would be performed by one engineer/procure/construct (EPC) contractor responsible for all facets of detailed design and construction of the facility. All construction would be performed according to approved construction drawings. Temporary construction facilities would be established as appropriate. Fencing would secure the site and access would be controlled by security personnel. Temporary construction offices, fabrication sheds, and storage areas would be erected as needed. Connections to the City of Sumas water and sewer systems would provide potable water, water for fire protection, and sanitary sewer facilities. The fuel oil storage tank would be surrounded by an earth containment berm sized to contain a volume one and one-half times greater than the volume of the 2.5-million-gallon tank. The containment area would have an impervious liner to avoid leakage into the soil or groundwater.

Construction Schedule, Workforce, Parking

The peak construction period would require approximately 400 construction workers for a four-month period. Total construction activity at the site is estimated to be 18 months. Some of the required skills are available locally, others are available within the state, and still others might have to be imported from out of state. Parking for construction workers would be accommodated in an area adjacent to the northeast corner of the site on land optioned by the applicant from the Port of Bellingham (see Figure 2-2). Access to the parking would be through a temporary road connecting the parking area to Hesselgrave Way.

2.2.1.2 Natural Gas Supply Pipeline

The 4.5-mile-long natural gas pipeline would be constructed from the Canadian border to the project site within the existing ROW, with a 10-foot separation from the natural gas pipeline now serving the SCCLP (Figure 2-3). The new pipeline would be within the existing ROW with the exception of the last portion of the line where it would continue north from the existing power plant across State Route 9 to connect to the S2GF. Pipeline construction would be performed during the driest time of the year to obtain maximum soil consistency and minimize water intrusion into the trench. Pipeline crossings under streams, riparian areas, wetlands, and similar sensitive areas would be drilled.

All pipe, fittings, and valves for the proposed gas pipeline would be manufactured according to specifications that meet or exceed the industry standard API-5L. The pipe would have a minimum wall thickness of 0.375 inches. Prior to operation, the pipe would be hydrostatically tested to 1.5 times the maximum operating pressure. The hydrostatic test would be maintained for 24 hours. The test water would then be removed, tested, and trucked to a suitable treatment facility for treatment prior to discharge.

In addition, the natural gas pipeline would be designed and constructed to meet or exceed all of the requirements set out in the partial settlement agreement between the applicant and the Washington State Utilities and Transportation Commission concerning natural gas pipeline issues (see Appendix G).

2.2.1.3 Water Supply/Wastewater Lines

Industrial water for process use and domestic water for personnel use would be supplied by the City of Sumas and connected to the site water systems at the site boundary. The City would extend an existing water line to the site to connect the potable water system (Figure 2-3). Approximately 1,000 feet of existing 6-inch-diameter pipe would be upgraded to 10-inch diameter, and an additional 300 feet of new 10-inch-diameter pipe would be required. In addition, the City would need to upgrade some of the existing pumps and install a new well at May Road well field to optimize system efficiency. All changes or construction of the City water system would be performed by the City.

Wastewater would be transferred to the City of Sumas systems at the site boundary. It would join the City wastewater stream for treatment in Canada. The wastewater line to Abbotsford has already been installed and is in use by the City. Within the City of Sumas, a gravity sewer extension, upgrade of Pump Station No. 3, and new 8-inch force main construction would be required to accommodate the S2GF wastewater. All changes or construction of the City wastewater system would be performed by the City.

2.2.1.4 Electric Transmission Lines

The U.S./Canadian 230 kV electrical transmission line proposed by SE2 would extend north from the site approximately 0.5 mile through the City of Sumas to the U.S./Canada border, and then follow the Canadian Pacific Railroad line for approximately 5.3 miles to BC Hydro's Clayburn station. The U.S. portion of this line would include the placement of nine wood power poles, and the stringing of the 230 kV conductor line along the route shown in Figure 2-3. The route of the Canadian portion of the line is described and evaluated in a separate document (Norecol-Dames & Moore 1999). SE2 would build the line from the plant to the Clayburn station.

2.2.2 Operation

The S2GF would operate on a continuous basis 24 hours per day, seven days per week. The facility staff (approximately 23) includes a plant manager, plant engineer, operators, mechanics, electricians, instrument technicians, and water treatment technicians.

2.2.2.1 Generation Plant

The facility would be operated from a central control room located in the turbine building which would be staffed at all times. Operating staff would be supported by written instructions, operating procedures, and emergency procedures. The control room's distributed control system (DCS) would continuously control and track plant operation. It would automatically set off alarms when "out of normal range" parameters are detected. It would automatically shut down equipment if the parameters exceeded preset limits.

Normal Facility Operation

Under normal plant operations, natural gas is sent to the two combustion turbines either directly or through a compressor if supply pressure is low. In each combustion turbine, the natural gas is mixed with compressed air and ignited, resulting in a large volume of hot exhaust gas. The exhaust gas then flows through the turbine section of the combustion turbine, transferring energy to the turbine shaft, causing the associated electric generator to produce electricity.

The expanded exhaust gas leaves each gas turbine and flows to a heat recovery steam generator (HRSG) where the energy in the exhaust gas is used to generate steam. High pressure steam leaves each HRSG and flows to the single steam turbine, where it transfers energy to the turbine shaft, producing additional electricity. Duct burners mounted in the combustion turbine exhaust ducts burn natural gas to increase the exhaust gas temperature, allowing increased generation of steam and thus increased generation of electricity. The exhaust gas from each of the two HRSGs passes through catalytic reactors which remove oxides of nitrogen (NOx) and carbon monoxide (CO) emissions, cooled to 176 degrees F, and discharged into the atmosphere via a 180-foot-high stack for each HRSG.

Electricity flows from the generators to the main transformers where the voltage is increased from 18 kV to transmission voltage. It then flows to a switchyard equipped with circuit breakers and on to the transmission lines. The system is equipped with relays that monitor the electrical system for faults or short circuits, reverse current, improper voltage or current, and other parameters. Upon sensing an improper situation, the relay opens the appropriate circuit breaker isolating its generator from the transmission line, allowing for repair or replacement.

The condensing system extracts heat from the exhaust steam and dissipates it to the air in the dry-cooled condenser or to water in the water-cooled condenser. Air is the prime cooling medium. Fans controlled by condenser temperature operate to draw air through the air condenser. Warm cooling water from the water condenser is sprayed onto the top of the cooling tower. It is cooled by air and evaporation of some of the water as it falls down through the tower. The cooled water then returns to the water condenser to complete the cycle. The wet cooling tower operation is not required when air temperatures are below 25 degrees F because dry cooling is adequate at or below that temperature.

Management of Fluids at Plant Site

The S2GF has numerous support systems such as water treatment, a fire protection system, emergency generator, boiler and cooling tower chemical feed systems, boiler blowdown, plant cooling water, raw water, and ammonia feed for emission control. All three turbines are equipped with lubricating systems. The lubricating oil is in turn cooled by the plant-wide cooling water system. All three turbines are equipped with hydraulic systems that operate control valves regulating fuel or steam flow to the turbines.

Inventories of working fluids would be maintained in appropriately designed and sized storage tanks. The tank for raw water and fire control water would store 1 million gallons. All systems would operate automatically, with control systems that alarm and shut down the system if any of the sensed parameters exceed preset limits. Plant equipment maintenance would be conducted as needed and under planned maintenance schedules by the permanent maintenance staff. In addition to the raw water/fire control water tank, a variety of other storage tanks would be required to support continuous operation of the plant. The contents and capacity of these tanks are listed in Table 2-1.

2.2.2.2 Site Security

During construction, the S2GF site perimeter would be enclosed with a permanent chain link fence and would have two ingress and egress gates. The gates would be staffed 24 hours per day or locked. Access to the project site by all personnel would be through the staffed security gate. All construction and delivery vehicles would be logged in and out by the gate security person.

Table 2-1: S2GF Storage Tanks[1]

Equipment Name	Contents	Estimated Gallons	Estimated Concentration
Backup Fuel Oil	No. 2 Diesel Oil	2,500,000[2]	100% Fuel Oil
Oxygen Scavenger Tank	Proprietary product containing hydroquinone	400-550	Premixed
Ammonia Tank	Ammonia solution	20,000	19% by weight
Corrosion Inhibitor Tank	Proprietary product and methoxypropylamine	400-550	Premixed
Feedwater Treatment Tank	Sodium Nitrate and Sodium Hydroxide	400-550	Premixed
Acid Tank	Sulfuric acid solution	6,000	93%
Caustic Tank	Sodium Hydroxide	6,000	30-50%
Biocide Tank	Glutaraldehyde	400-500	Premixed
Biocide Tank	Isothiazolinone	400-500	Premixed
Lube Oil Tank Steam Turbine 1	Lubricating Oil	5,500	
Lube Oil Tank Comb. Turbine 1	Lubricating Oil	9,800	
Lube Oil Tank Comb. Turbine 2	Lubricating Oil	9,800	
Steam Turbine Control Fluid	Phosphate Ester Fluid	300	
Diesel Generator Fuel Tank	No. 2 Diesel Oil	1,000	
Sodium hypochlorite tank	Sodium hypochlorite aqueous solution	400-500	12.5% by weight
Combined Turbine 1 Control Fluid	Mineral Oil	100	

[1] Does not include water storage/fire water tank.

[2] In its final briefing to the Energy Facility Site Evaluation Council (September 5, 2000) the applicant proposed to reduce the diesel storage tank size to 1.5 million gallons. The environmental impact of this proposed design modification has not been analyzed in this FEIS.

The parking area for the construction contractor employees would be fenced with temporary fencing and used for employee parking, construction office trailers and other temporary uses during construction. A temporary access road would be provided. Silt fences and hay bales would be erected around wetlands and other protected areas to exclude vehicles and pedestrians. At the completion of construction, the temporary fencing would be removed and the area restored to open land. Parking access gates would open during working hours and be secured by site security after working hours.

During the operation phase, the S2GF site would retain the perimeter fencing and access gates used during construction. A security person would monitor the site entry gate eight hours per day Monday through Friday. During off hours, holidays and weekends, the access gate would be monitored by onsite personnel from the main control room using closed circuit television and voice intercom recorders.

Parking for operations and maintenance personnel would be outside the fenced area. Personnel access would be through a site personnel gate using either a card/code entry system or by checking in with the security person at the office. Vendor equipment personnel, maintenance contractors, material suppliers, and all other third parties would require permission for access from a designated site employee prior to entrance. Access to critical areas would be granted on a project/job need basis by the Plant Manager.

SE2 would establish an emergency response plan for the S2GF plant to ensure employee safety from the following emergencies: onsite chemical release, flood, medical emergency, major power loss, fire, extreme weather, earthquake, volcano, and bomb threat. The plan would be established prior to completion of construction. The plan would follow the requirements of WAC 296-24-567 and 296-62-3112 and 29 CFR 1910.38, Emergency Action Plan. All hourly and salaried employees, including administrative staff as well as contractors and visitors, would be covered by the plan.

2.2.2.3 Transmission Line Maintenance

Trees would be maintained within transmission line ROW to prevent interference with the electrical transmission lines. Vegetation management of tall, dead, and dying trees is required to prevent damage to the transmission lines from windthrow. Within 25 feet of the power lines, all trees of a mature height of 25 feet or greater would be removed. Trees less than 25 feet may remain, and tree trimming is permitted in the wire and clearing zone if tree removal is not desired due to ownership, environmental, or cost considerations. Between 25 and 30 feet out from the power lines, maintenance includes trimming structurally sound conifers that are 20 inches in diameter or greater, and deciduous trees that are 25 inches in diameter or greater. Trees less than the specified diameter would be removed. Outside of 30 feet, maintenance includes the removal of dead, dying, and unstable trees. Trimmed material and tree trunks are typically left on the ground in naturally vegetated areas as habitat features.

2.2.2.4 Natural Gas Pipeline Operation and Maintenance

The natural gas pipeline ROW would be patrolled monthly and checked by trained personnel. The following are typical of the type of events to be investigated:

- Any evidence of gas leaking (dying or dead vegetation, odor)
- Actual or threatened ground movement
- Flooding or unusual erosion
- Subsidence or cracking of land or paved surfaces
- Construction or other work by others near the pipeline

- Required maintenance items such as fences, brush removal, etc.
- Missing or mutilated pipeline markers
- Evidence of damage or corrosion on exposed pipeline components
- Evidence of vandalism
- Inoperative or damaged cathodic protection facilities

Regular natural gas leak surveys along the buried pipeline ROW would be performed at required intervals by personnel walking the pipeline ROW directly above the pipeline using appropriate natural gas instrumentation. The above-ground natural gas pipeline facilities would be inspected also, and maintained to meet or exceed all regulatory requirements.

In addition, the natural gas pipeline would be operated, monitored and maintained in accordance with the requirements set out in the partial settlement agreement between the applicant and the Washington State Utilities and Transportation Commission concerning natural gas pipeline issues (see Appendix G).

2.2.2.5 Backup Power Generation Fueling

SE2 would release its share of the natural gas supply to other users during periods of high demand for natural gas, and use backup fuel oil during that period. The combustion turbines are capable of dual fuel operation, switching from one fuel to the other without interrupting service.

Historic international natural gas shortages have occurred during the winter. The approximate frequency of these shortages is typically five days out of every 20 days during the winter months.

The 2,500,000-gallon fuel oil storage tank on the S2GF site would be filled at the completion of construction and kept full. The fuel storage tank would be constructed on an impervious basin surrounded by an impervious earthen berm designed to contain one-and-one-half times the volume of the tank, and to prevent leakage into the underlying soil and groundwater.

A long-term contract to supply and deliver oil as required would be secured before beginning commercial operation of the S2GF. The rate of fuel delivery is dependent on the fuel use rate. Fuel delivery rates would be established to:

- Maintain a 1,000,000-gallon minimum fuel oil reserve in the tank
- Keep truck deliveries to a maximum of 12 hours per day, Monday through Saturday
- Maintain supplies sufficient to meet the expected length of oil firing and the time available to restore inventory before the next expected oil use period begins

Fuel oil delivery trucks would proceed to the fuel unloading station, which connects the truck to the oil storage tank and allows the truck to unload into the tank without affecting the plant operation. The unloading station area would be curbed, and necessary spill response equipment kept readily available to contain any accidental oil spills.

2.2.2.6 Water Supply and Discharge

Water Supply

The maximum instantaneous water supply demand for the S2GF is approximately 760 gallons per minute (gpm), or 1.1 million gallons per day. To meet this demand, the City of Sumas has agreed to supply water to S2GF from its two well fields: the May Road well field (nonpotable, industrial supply) and the municipal well field (potable supply) located just north of the west end of Kneuman Road.

The S2GF peak water demand of 760 gpm is estimated based on an 833 gpm cooling water makeup demand (minus approximately 89 gallons that would be recycled on site) and a 16 gpm boiler makeup and miscellaneous system demand. The cooling water makeup demand would vary with the seasonal air temperature at the plant, as shown in Table 2-2 below:

Table 2-2: S2GF Cooling Water Makeup Demand

Air Temperature At Plant (degrees F)	Cooling Water Makeup Demand (gpm)
25 and below	0
40	580
50	620
59 and above	760 (peak)

The peak cooling tower water demand of 833 gpm would be required during times when ambient air temperatures exceed 59 degrees F.

Discharge

Since the submittal of the Draft EIS, the City of Abbotsford and the Fraser Valley Regional District have indicated that they will not augment an existing sewage service agreement in place with the City of Sumas in an amount sufficient to accommodate the new flow originally planned for S2GF. Because of this, the City of Sumas has notified SE2 that the only discharge capacity available to them would be through an existing contract with SCCLP (a sister company) that allows for daily discharge of 80,000 gallons per day. Consequently, the two plants would need to have a combined discharge capacity that is equivalent to what is currently allowed for SCCLP, provided that the wastewater quality meets all applicable codes.

To accommodate the above discharge requirements, the applicant is proposing to redesign the project's cooling tower design to recycle cooling tower blowdown water using reverse osmosis. The projected combined cooling tower blowdown and domestic sewage flow of S2GF would be discharged to the City of Sumas sanitary sewer system at a maximum rate of approximately 27 gpm, or 39,000 gallons per day.

2.3 Construction and Operational Costs

The construction cost of the project is estimated at approximately $385 million. Table 2-3 provides estimates for the costs of each component included in the project.

The operational costs of the project would include employee payroll, purchases of goods and supplies, and taxes. The estimated gross payroll (including fringe benefits and other payroll overhead) for the operational workforce is $1.35 million, based on the IMPLAN regional economic database for electric utility workers, or an average annual wage of $58,500 per employee. (IMPLAN is the registered trademark of the Minnesota IMPLAN Group, Inc., suppliers of the regional economic input-output model and supporting databases.) In addition, a temporary workforce of the appropriate skills would be used during major maintenance or other non-routine operational work.

Table 2-3: Estimated Project Costs by Component

Component	Cost ($)
Land	1,180,000
Combustion turbine generators	72,000,000
Steam turbine generators	48,000,000
Heat recovery steam generator	26,288,000
Transformers and electrical equipment	8,304,000
Condensing system	17,200,000
Balance of plant equipment	20,786,000
Structures, civil and mechanical	44,090,000
Transmission line to B.C.	7,803,000
Gas pipeline	2,350,000
Spare parts	3,800,000
Engineering, construction management, and start-up	14,480,000
Indirect and other construction costs	36,788,000
Permitting, project management, and other owner costs	17,253,000
Interest during construction	21,000,000
Other financing costs	10,175,000
Contingency	33,836,000
Total	$385,333,000

Based on the IMPLAN regional economic modeling database for electric utilities, a power plant employing 23 full-time workers would have a gross annual output valued at $10.13 million and would generate another $1.2 million in purchases from suppliers (including fuels, maintenance supplies and services, retail goods, and professional services). Sales, use, and other indirect business taxes on that level of output are estimated at $1.78 million per year, which would accrue to state and local government jurisdictions.

With a gross payroll of $1.35 million, net payroll would be approximately $1 million and net after-tax income would be approximately $750,000. Assuming 85 percent of this is spent in the county, this would be approximately $650,000.

Property taxes to be assessed on the S2GF and associated facilities have not been determined, but could amount to several million dollars per year in view of the project's projected total cost of $385 million (Sumas Energy 2 1999).

2.4 Mitigation Measures Inherent in the Project Design

In addition to complying with applicable codes and standards, and the application of Best Management Practices for erosion and sedimentation control, a number of measures have been included by the applicant in the facility design to eliminate or minimize the impacts of the project on the environment. These measures are described below.

A Storm Water Pollution Prevention Plan would be developed to address the construction activities and handling of hazardous substances associated with the construction of the power plant, the gas, water, and wastewater pipelines, and the transmission lines. The plan would address structural controls (silt fences, straw bale barriers, etc.), vegetation practices (temporary and permanent cover practices), and site management of solid, liquid, and hazardous materials and wastes. All pre- and post-mitigation measures identified in the settlement agreements with Ecology and WDFW would be implemented (Appendix G.)

2.4.1 Generation Plant Site

The following mitigation measures are inherent in the generation plant site design:

- The power plant has been configured to preserve an existing 8.8 acres of forested wetlands and 0.6 acres of palustrine fringe wetlands onsite (a total of 9.4 acres).

- 3.17 acres of new wetlands would be created, 5.99 acres of wetlands would be enhanced, and 0.81 acre of buffer would be created or enhanced for a total of 9.97 acres to replace the 2.81 acres of farmed wetlands and wetland ditch that would be filled for the project site.

- All 9.4 acres of preserved wetlands, and 9.97 acres of new or enhanced wetlands would be dedicated to the City of Sumas as permanent open space or placed in a conservation easement.

- The turbines would be placed within an enclosed building to help lessen the noise.

- The plant buildings and exhaust stack would be painted in earth tones to reduce the visual contrast with surrounding areas.

- The site would be landscaped around the perimeter and around permanent parking areas to buffer the visual impacts from surrounding roadways and residential areas.

- The plant would use a combination wet/dry cooling system and recycle cooling tower blowdown water using reverse osmosis to reduce water usage and wastewater discharge.

- The applicant has agreed to measures to reduce or mitigate air emissions from the proposed facility. These measures include implementing Best Available Control Technology (BACT) and Toxic Best Available Control Technology (T-BACT) to control emissions of regulated pollutants under the requirements of the Prevention of Significant Deterioration Program of the Clean Air Act, funding construction of an air monitoring station on Sumas Mountain, reducing the number of days of back-up fuel operations to an average of ten days per year on a ten-year rolling average, and discussing cooperative arrangements for curtailment of power generation during "bad air" episodes in the Lower Fraser valley with the British Columbia MELP and BC Hydro.

2.4.2 Natural Gas Supply Pipeline

The following mitigation measures are inherent in the natural gas supply pipeline design:

- The pipeline would be placed in the existing natural gas pipeline easement to avoid creating a new utility corridor. The pipeline would be laid parallel to the existing pipeline, and approximately 10 feet away to minimize the width of the corridor.

- The existing ROW traverses agricultural land, all of which has been restored to its former use since the placement of the existing pipeline.

- The pipeline would be buried deep enough (at least 4.5 feet below the ground surface) to allow agricultural activities to resume over the top of the pipeline following construction.

- Pre-construction wetland hydrology would be maintained with the installation of impermeable plugs at the edges of the wetlands, and impervious material in the pipeline trench below wetlands.

- The pipeline would be drilled beneath all streams (Sumas River, Bone Creek, and Johnson Creek) and wetlands to reduce the potential for impacts to the waterways.

- The drill pits would be placed outside of the wetland, buffer, or riparian areas.

- All staging and equipment would be in non-wetland areas.

- No staging of equipment or stockpiled soils are proposed within 50 feet of the wetlands, except for temporarily side-cast trench material in the approaches to the drilled sections.

- No trees would be removed for the installation of the new pipeline.

- The top 12 inches of soil would be stockpiled separately from underlying soils, and replaced in the upper 12 inches above the backfilled pipeline trench.

- Silt fencing would be used to protect wetlands outside the construction corridor from sedimentation.

- The flow of the existing ditches would be restored and maintained after construction.

- Disturbed areas would be revegetated with native vegetation, or vegetation consistent with ongoing agricultural use.

- Proper erosion and sediment control measures would be carried out during all phases of utility line installation to prevent the uncontrolled discharge of turbid water, dredged or excavated material, or soils into waters of the state.

- Erosion control structures or devices would be regularly maintained and inspected to ensure compliance with state water quality standards.

Additionally, experienced pipeline engineers would design the natural gas pipeline to meet or exceed all regulatory and safety requirements. The pipeline design would include the following safety features:

- All pipe, fittings, and valves would be manufactured for gas pipeline use.

- The pipe would be manufactured according to specifications that exceed the industry standard API-5L.

- The pipe would have a specified minimum yield strength of 42,000 pounds per square inch (psi) or greater.

- The pipe would be coated with fusion-bonded epoxy or an equivalent watertight coating to minimize the possibility of corrosion.

- The pipeline would be further protected from corrosion by a sacrificial anode cathodic protection system. The system prevents corrosion by counteracting or preventing electrolytical currents that cause corrosion. The cathodic protection system would be designed based on the results of a site-specific cathodic protection survey. It would include sacrificial anode beds installed at intervals along the pipeline. Test stations would also be installed at several locations along the line to facilitate monitoring of the system.

- Pressure control instrumentation would be used to keep the pipeline operating within specified pressure limits. Emergency pressure relief valves with vent stacks would be installed near the facility to relieve natural gas pressure buildup if a surge condition occurs. These relief valves would prevent the pressure in the line from rising above maximum allowable operating pressure (MAOP).

- A remote shut-off valve operated from the facility main control room would be installed at the border pressure reducing station. In the event of a leak or break in the pipeline, the valve at the border pressure reducing station could be closed from the facility control room. The turbines would continue to operate to remove gas from the line, but would eventually turn off due to low pressure. At that time, a manual valve would be closed at the facility to isolate the line.

In addition, safety measures during the construction of the pipeline would include the following:

- Construction would be governed by a comprehensive set of specifications, and would be monitored by an experienced construction management team to ensure compliance with those specifications. These specifications would be provided to EFSEC for review and approval prior to the start of construction.

- Although federal regulations require natural gas pipelines to be buried a minimum of 3 feet, SE2 would construct the pipeline at a minimum depth of 4.5 feet to ensure that farming equipment would not come in contact with the pipe.

- Welding inspectors would be onsite during construction to inspect each weld and verify that proper welding procedures have been used. SE2 would inspect all welds radiographically.

- All pipe bends would be large-radius bends to minimize stress on the pipe.

- Following installation, SE2 would test the pipeline hydrostatically to not less than 1.5 times the MAOP prior to covering.

- Following construction, SE2 would conduct an internal line inspection with an internal inspection device commonly known as a “smart pig.” This internal line inspection would verify the integrity of the line, remove debris, remove liquids remaining from the pressure testing, and serve as a baseline for use in evaluating the pipeline’s condition with subsequent inspections. A “pig” receiver and launcher would be installed at the border regulating station and at the facility to allow for efficient and safe insertion and removal of the internal inspection device.

SE2 would operate and maintain the natural gas pipeline to ensure its integrity and safety. Operation and maintenance of the pipeline would follow a comprehensive set of procedures, including the following:

- The location of the pipeline would be marked with staked signs. There would also be a warning tape placed in the trench above the pipeline to warn anyone excavating in the vicinity of the pipeline's location.

- Qualified inspectors would inspect the physical condition of the ROW, watching for encroaching activities that might damage the pipeline and other causes for concern, although a specific inspection schedule has not been determined. Construction work in the pipeline corridor would be discouraged and avoided whenever possible. If construction cannot be avoided, an SE2 inspector would mark the location of the pipeline and supervise construction activities to avoid damage to the pipeline.

- Qualified inspectors would monitor the effectiveness of the cathodic protection system. This monitoring would include testing of the pipe-to-soil potential foreign structure bond (interference) and the pipeline insulator. The monitoring would comply with federal safety regulations found in 49 CFR Part 192(1). All tests, schedules, criteria, and reports would be met or completed in accordance with the regulations.

- SE2 would conduct internal ("smart pig") inspections of the pipeline to verify weld and pipe wall thickness and integrity on a regular basis, at no more than five-year intervals.

- Additional safety and monitoring measures would be adopted as described in Appendix A of the Partial Stipulation and Settlement Agreement between the Washington Utilities and Transportation Commission and Sumas Energy 2 Concerning Natural Gas Pipeline Issues, included in Appendix G of this EIS.

2.4.3 The U.S./Canadian 230 kV Transmission Line

The following mitigation measures are inherent in the U.S./Canadian 230 kV transmission line design:

- Trimmed material and tree trunks typically would be left on the ground in naturally vegetated areas for habitat features.

- Footing construction areas would be re-seeded as necessary.

2.5 Description of No Action Alternative

Under the No Action Alternative, the proposed S2GF power plant, natural gas supply pipeline, water and sewer pipelines, and transmission lines would not be built. Power providers would continue to use other existing or new power sources to meet the needs of their customers. For the purposes of this EIS it is assumed that these sources would be combined cycle combustion turbines.

2.6 Alternatives Considered by SE2 but Not Brought Forward

During the planning phase SE2 considered alternatives for the plant site location, utility routes, and water supply. These alternatives are discussed below.

2.6.1 Generation Plant Site

To facilitate the use of an existing natural gas transmission corridor, only sites immediately adjacent to the existing plant or in proximity to it were considered.

Five sites, including parcels offering alternative siting configurations, were initially reviewed. Two sites were south of State Route 9: an 18.4-acre site immediately to the west of the existing power plant (the “Zan Marquis” property); and a 5.6-acre site immediately to the east of the existing power plant (the “Dentec” property). Three parcels north of State Route 9, including the selected site, were considered as a means of reconfiguring the plant to avoid wetlands: the selected 37-acre site; a 10.71-acre parcel immediately to the east of the selected site (the “Port of Bellingham” property); and a 6.1-acre parcel immediately north of the selected site (the “Tegrat” property). All five sites are zoned for industrial use, and all five provide direct access to State Route 9 and access to the U.S./Canadian border at Sumas.

The parcels north of State Route 9 offering alternative siting configurations were eliminated due to their unavailability to SE2 at the time that the site configuration was finalized. Early options on these properties expired, and other parties holding options exercised them, leaving them unavailable to SE2. The Dentec site was eliminated early in the siting process as being too small and narrow to accommodate the needed facilities. No site plan was developed for this alternative. The following discussion compares the selected site (Hesselgrave) with the primary alternative (Zan Marquis) based on the following criteria: size, proximity to available utilities and gas supply ROW, compliance with City of Sumas zoning and comprehensive plans, access, and availability of the property.

2.6.1.1 Size

To accommodate the project, a site of at least 18 to 20 acres of flat, contiguous land in proximity to utilities, gas supply, and electric transmission routes is necessary. Major project facilities must be sited adjacent to each other to achieve necessary operating efficiencies. The electrical switchyard and transformers must be adjacent to the gas combustion and steam turbine generators for power efficiency. The cooling towers must be in proximity to the heat recovery steam generators to reduce construction costs for water and steam piping systems. The cooling towers and the electrical switchyard must be at opposite ends of the site to avoid dangerous conditions from the steam generated by the cooling towers. Within the City of Sumas, there are only two potential sites with adequate acreage for project facilities and proximity to utilities and gas/electric lines. Of the two sites, the Hesselgrave site (selected site) was preferable for its size and availability. The alternative site (Zan Marquis property) is located west of the SCCLP, is smaller, and has more design constraints, but is similarly zoned for industrial use within the City of Sumas.

2.6.1.2 Proximity to Available Utilities and Gas Pipeline Easement

A suitable site must be close to utilities and existing gas supply lines and electrical substations to decrease the cost and impact of constructing new utility and gas pipelines and electrical transmission lines. The site allows minimum construction of new transmission lines without losing any accessibility to the electric power purchasers. The selected site already has City of Sumas industrial water supply lines in place. Water supply and water treatment can be provided by municipal utilities from existing sources, although larger-diameter piping would be required. The selected site is accessed from roads built to industrial standards for heavy hauling from the U.S./Canadian border. All but 2,175 feet of the natural gas supply line easement already exists through 4.5 miles of agricultural land from the site to the U.S./Canadian border. The balance of the gas line easement is through industrial land operated by an affiliate of SE2. Additional water, sewer, and electric transmission lines are located within industrial land, railroad ROW, or City of Sumas ROW for a heavy haul arterial road (Bob Mitchell Avenue). By comparison, the Zan Marquis property is approximately 2,200 feet farther south of water, sewer, and electrical lines, but closer to the natural gas pipeline easement.

2.6.1.3 Compliance with City of Sumas Zoning and Comprehensive Plans

The selected site meets local zoning requirements. It is within the City of Sumas in an area designated and zoned by the City for industrial development. This site was previously approved by the City of Sumas and the Northwest Air Pollution Authority as the location of a recycled paper mill, but that project was recently abandoned. It is adjacent to the 125 MW SCCLP (across State Route 9) which began operation in 1993. The City of Sumas encourages industrial development at the site and already has in place most of the public infrastructure required for the project (water, sewer, transportation, fire protection). The Zan Marquis property is similarly zoned and planned for industrial development.

2.6.1.4 Access

The site has ready access. It is bordered on the south by a local service road extension of Bob Mitchell Way and State Route 9, to the east by Bob Mitchell Way, to the north by the Burlington Northern Railroad and an undeveloped industrial site, and to the west by a wooded area to be preserved as a mitigation site for the project. The Zan Marquis property is located on the south side of State Route 9 and would require access from the highway, increasing transportation impacts.

2.6.1.5 Availability of the Property

The 37-acre site selected for the project was previously under option by an affiliate of SE2. The renegotiation of this option made the site available. Other sites with similar proximity to utilities and the SCCLP were either too small or not available. SE2 could not successfully negotiate an option to purchase the Zan Marquis property, on the west side of the SCCLP, making it unavailable for the project.

2.6.2 Water Supply

Water supply alternatives are limited by the existing water rights allocated to the City of Sumas and adjacent water associations, the effects of endangered fish listings and instream flow requirements, and the difficulty in obtaining new water rights in the State of Washington. The January 1999 ASC was based on obtaining water from the City of Sumas, that in turn would have purchased the water from the City of Abbotsford, British Columbia. Due to the restrictions on the export of water from British Columbia, the project has been redesigned to use a wet/dry cooling system as described in the January 2000 revised ASC. This system reduces the cooling water needs from a maximum 2,800 gallons per minute (gpm) to a maximum 849 gpm. The City of Sumas would supply the water using the unused portions of their existing water rights, supplemented by onsite storage.

2.6.3 Wastewater Discharge

Wastewater from the S2GF would consist of cooling water blowdown, chemical neutralization tank discharges, and plant domestic sanitary sewage. The applicant proposes to use the allocation currently available to the existing SCCLP facility to discharge S2GF wastewater to the City of Sumas sewage system, and thereby convey this wastewater to the JAMES water treatment plant in Abbotsford, B.C. Several alternatives to sending the S2GF wastewater for treatment at the JAMES plant in Canada were reviewed by SE2, as described below.

At the outset of application submittal to EFSEC and project review, the City of Sumas had a wastewater treatment plant and NPDES permit to discharge up to 124,000 gallons per day (gpd, average daily flow in maximum month) to the Sumas River. This permit has since been terminated, and all City of Sumas wastewater is sent for treatment to the Canadian JAMES water treatment plant.

The existing SCCLP holds State Waste Discharge Permit ST 7357 to truck cooling tower blowdown to the City of Bellingham publicly owned treatment works (POTW). The expense of trucking blowdown to Bellingham was the major reason that SCCLP joined the City of Sumas in financing and obtaining permits for the Sumas Sewer Services Agreement with Abbotsford and Fraser Valley Regional District (FVRD).

The City of Sumas currently does not have an NPDES permit to treat and discharge its wastewater. Constructing a new treatment plant and obtaining a new NPDES permit for the S2GF alone would be difficult to defend as a preferred alternative.

Treatment at the JAMES plant through Sumas' contract is an acceptable alternative. With prior permission of the FVRD, cooling tower blowdown is an acceptable waste. Precedent has already been set with Abbotsford/FVRD acceptance of SCCLP cooling tower blowdown. The regional JAMES plant has been designed to effectively treat this type of waste.

2.6.4 Electrical Transmission Line

The facility would be interconnected to the BC Hydro 230 kV transmission system through a new switchyard located at the project site and a new 230 kV transmission line to the Canadian border, approximately 0.5 mile in length (Figure 2-3). Power would then be transmitted approximately 5 miles along a Canadian Pacific Railroad ROW to BC Hydro's Clayburn substation outside Abbotsford, B.C.

Three alternatives for the U.S. portion of the transmission route were considered between the plant site and the border, all three lying within the City of Sumas. They are referred to as Routes i, ii, and iii (Figure 2-4). An environmental evaluation of the transmission route within Canada has been separately documented to meet the requirements of the Canadian National Energy Board (NEB) permit process, and has been submitted to the NEB (*Final Report, Environmental Assessment Report, Sumas Energy 2, Inc. 230 kV Electric Transmission Line, Sumas, Washington to BC Hydro's Clayburn Substation, Abbotsford, B.C.*, Norecol-Dames & Moore 1999).

Route i has the greatest potential for environmental impact of the three routes. This route leaves the plant site heading west, then follows the Burlington Northern (BN) Railroad ROW to the northeast. In examining this route, engineering and wetlands consultants and a project representative talked to the new land owners of the old Railroad Depot property, who are developing a rail car loading/off-loading facility. This property is to the north of the project site and located between the old BN ROW and Bob Mitchell Avenue. The developers' intended use of the property would require transmission Route i to follow the northwestern side of the railroad ROW, which the developers have purchased from BN. While it would be possible to site a transmission line on the northwestern side of the ROW, poles and foundations would be located within some wetlands areas to accommodate the proposed land use by the new owners. If the railroad ROW was used, the transmission line would proceed northeast. Before reaching Sumas Creek the transmission line could move to the center of the ROW so as to move away from wetlands. Even with this mitigation measure, there would be a number of "danger trees" that would need to be trimmed along the northwestern side of the ROW near Sumas Creek.

Figure 2-4

City staff identified the Sumas Creek area west of Bob Mitchell Avenue as part of a habitat mitigation zone being created by the City. From Sumas Creek the transmission line would proceed north to the Canadian border along the railroad ROW.

The preferred route (**Route ii**) starts from the plant site and proceeds east to Bob Mitchell Avenue. It then follows the northwestern side of Bob Mitchell Avenue as it heads northeast crossing the BN spur line, principally using City ROW. The transmission line would then proceed along the northwest side of Bob Mitchell Avenue, but on an easement from the Railroad Depot owners that would be located away from the road and on the edge of a "bio-swale" within the property. This would further use the erosion-control land reserved for the "bio-swale" and allow room to reposition the transmission line.

Transmission poles would not interfere with the erosion-control function. Before Bob Mitchell Avenue reaches Sumas Creek, the transmission line would cross to the southeast side of Bob Mitchell Avenue. This would allow the transmission line to be moved away from the habitat mitigation area identified by Sumas City staff on the west side of Bob Mitchell Avenue and onto a cleared piece of City-owned property. The transition across Bob Mitchell Avenue would also allow a straighter transmission line route, with less foundation/pole impact. Also, the amount of danger tree clearing would be less with this proposed route. Most danger trees are to the west near Sumas Creek or to the east of Bob Mitchell Avenue across from the southern end of the Railroad Depot property. From the City-owned property south of the corner of West Garfield Street and Bob Mitchell Avenue, the transmission route would proceed north to the southeast side of the centerline of the BN railroad ROW. This would take the transmission line between two groves of trees. It might require some tree trimming on the small group of trees to the east of the ROW. Then the transmission line would proceed north to the Canadian border along the cleared and industrial railroad switching area, keeping to the west of the tracks and the access road. Again, some danger trees to the west of the transmission line may need to be cleared near the border. At the Canadian border the BN ROW meets the Canadian Pacific (CP) ROW.

The third route (**Route iii**) would exit the plant site to the east and proceed along the northwest side of Bob Mitchell Avenue, until intersecting the BN rail spur. At that point the transmission route would turn due east and go cross-country. Danger trees to the east of Bob Mitchell Avenue may need to be trimmed. The transmission line would proceed along the south side of West 3rd Street to Johnson Avenue. Then it would proceed north using City ROW along Johnson Street to West Garfield Street. This route would put the transmission line near several homes. From West Garfield Street the route would proceed north along the railroad ROW until it passes between two groves of trees. Then the route would proceed due north on the west side of the railroad switching spur and access road, like the other two routes.

2.6.5 Natural Gas Supply Pipeline

The availability of an existing, permitted pipeline ROW serving the existing SCCLP eliminated further consideration of any other pipeline routing alternatives for the S2GF.

2.6.6 Cooling System

Both dry cooling and water cooling technologies were initially considered by SE2 for the S2GF. A dry cooling system uses large quantities of fin tubes for the heat transfer surface. Large fans are used to transfer the heat from the finned tubes (cooling water inside the tubes) to the atmosphere. Compared to a water cooling system, the efficiency of a dry cooling system can be reduced by temperature extremes, has a higher auxiliary power consumption than a water cooling system (which reduces the power available for export), has a higher fan noise, and requires a larger capital investment. Because there was a ready supply of industrial-grade water made available from Abbottsford, B.C. and the City of Sumas, further consideration of a completely dry-cooled alternative was eliminated.

However, when the required industrial grade water to operate a water cooling system became no longer available from Abbotsford, the City of Sumas became the sole source. Because the available supply from Sumas is limited to about one-third of the volume of water required for water cooling system, SE2 engineers redesigned the S2GF to use the combined water cooling/dry cooling system proposed in the revised ASC (Sumas Energy 2 et al. 2000).

2.7 Benefits or Disadvantages of Reserving Project Approval for a Later Date

The disadvantages of reserving project approval for a later date would be continued reliance on a constrained regional energy and capacity system. Advantages of reserving project approval to a later date may include a better understanding of its energy benefits. Also, emission control technology is continuing to improve and may offer better controls in the future.